TABLE 1.—*Wind direction frequencies in 32 pilot-balloon flights of 5,000 meters or more, made at Schofield Barracks, Oahu, Hawaii, by the Meteorological Section, Signal Corps, United States Army, from April 5 to August 21, 1923.*

[ϕ=21° 30′ N. λ=158° 4′ W.]

Altitude in meters.	Wind direction.																
	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.	Total.
12,688												1						1
12,000												1						1
11,000												1						1
10,000								1				2						3
9,000				1				2		1		2				2		8
8,000	2				1		1	1		1		3	1					10
7,000		1	1		4				1	2	2	2	4	1				18
6,000	1	1	1	2	2			2		2	4	2	4	1		1	1	24
5,000	1	1	1		2	2	3	3	1	3	5	2	2	3	1	2		32
4,000	1		2	1	2	7	3	1	1	2	4	1	3	1	3			32
3,000	1		1	5	8	5	4		1	1	2	2			1		1	32
2,000		2	1	4	9	7	4	2	1		1		1					32
1,500			3	3	8	7	3	2	1			1	2	1	1			32
1,000		1	2	1	11	2	7	2	4				1		1			32
500			3	6	13	8			2									32
250	1		1	8	17	2		2		1								32
000		1	3	3	13	5		2					1			1	3	32

at 8 kilometers, 5 had an easterly and 5 a westerly component; at 9 kilometers 5 out of 8 were westerly; and out of 3 observations at 10 kilometers, 2 were west-southwest and 1 south-southeast.

It thus appears that on the average the dividing surface between the trades and the antitrades during these months was between 4,000 and 5,000 meters, but that not infrequently easterly and northerly winds extend very much higher. It is also true that westerly and southerly winds frequently begin very much lower. Winds between east-southeast and south-southeast occur with considerable frequency throughout the first 5 kilometers, but so far as the table shows westerly winds are infrequent below 4 kilometers. There are days, however, when the trades are very shallow, and westerly winds begin at a much lower elevation. The accompanying figure indicates the course of 7 flights, none of which exceeded 3,300 meters, and all of which began with trade winds at the surface but quickly entered winds from a westerly direction. In one case an east-northeast wind at the surface became west north-west at 500 meters. Five out of the 7 changed through north to west, and 2 through south. Of the total number of flights examined, 105 were made in the forenoon and 92 in the afternoon, but of the 7 showing very shallow trades, all but 1 were made in the afternoon. Is there an important diurnal factor in the depth of the trades?

Cumulus or strato-cumulus clouds usually overhang the mountain range to the west and southwest of Schofield Barracks, and the greater number of the balloons are lost to sight in these clouds. The 32 flights of 5 kilometers or more were made on days either more than usually free of these clouds, or on days when the lower wind was such as not to carry the balloons into them. It may be, therefore, that the 32 flights, owing to this selective principle, are not truly representative. Their general indications agree very well, however, with the commonly accepted statement of the average depth of the trades in this latitude.

This brief examination has shown the existence of considerable variation in the trade winds, even at their center in mid-ocean, and suggests important problems for further investigation. With the development of aviation in interisland travel the depth of the trades will cease to be of exclusively theoretical interest, and become a matter of practical importance.

NOTES, ABSTRACTS, AND REVIEWS.

MEETING OF THE COMMISSION FOR RADIATION RESEARCHES.[1]

Some of our colleagues will be pleased to know that on the occasion of the International Conference of the Chiefs of Meteorological Institutes at Utrecht, Holland, in September, 1923, our Commission for Radiation Researches resumed its work, after a long pause. Actinometry, especially, needs mutual international collaboration, and as early as the meeting in Switzerland of 1912 efforts were made to bring this about.

The meeting of our commission at Utrecht produced satisfactory results and we are hopeful for the future. In spite of the small number of members present at the sessions, some important reports and propositions concerning organization and instruments were presented, and received further consideration at the Conference of Chiefs of Meteorological Institutes, which held its sessions on September 7–14, 1923.[2]

Dr. Anders Ångström (Stockholm), secretary of the commission, presented some practical propositions, and Doctor Gorczyński (Warsaw) who had just returned from a long journey to the Far East, presented his important new actinometric measurements made in Siam, India, Java, and France. Our Commission for Radiation Researches had the great pleasure of receiving new members from Holland, France, Switzerland, Germany, and Austria.

ABSTRACT OF THE PROCEEDINGS OF THE COMMISSION.

A. Questions of organization.—The commission regards it highly desirable that:

(1) A central institute equipped with absolute instruments be organized in Europe. The purpose of this institute should be to exert control and make comparisons of actinometric instruments and, in general, to make investigations regarding such instruments.

(2) A central actinometric station in every country should be equipped with instruments for absolute measurement, to be used as national standard instruments.

[1] Transmitted by J. Maurer, chairman of the commission.
[2] See this REVIEW, September, 1923; 51: 467.

(3) A number of secondary actinometric stations should be established in each country. These stations may be equipped with secondary instruments for relative measurements, standardized through comparison at the central station of the country.

(4) The commission discussed the proposition of Doctor Ångström relative to "The possibility of obtaining economic support for an effective international cooperation in meteorological radiation researches." A subcommission consisting of Messrs. Maurer, Ångström, Chistoni, Dines, Gorczyński, and Stenz was appointed to investigate the necessary expenses of maintaining a central institute charged with the comparison and control of instruments.

(5) The discussion of the proposition of Professor Chistoni regarding a new terminology in regard to certain instruments and branches of radiation research, was postponed to a later meeting.

(6) In regard to the proposal of Professor Chistoni that the central institute be located at Potenza, Italy, the commission may refer to the discussion presented by Messrs. Ångström and Lindholm (Appendix I). Further discussions were postponed to the next meeting.

(7) According to a proposition by Doctor Kimball (United States), the commission decided to emphasize the desirability of further investigations regarding the possible existence of an influence of cosmical dust upon the variations of solar radiation.

B. Questions regarding instruments.—(1) The commission decided to indorse the opinions expressed by Messrs. Ångström and Lindholm in a report read before the commission "Regarding a central actinometric station and the pyrheliometric scale", and decided that this report should be added to the protocol as an appendix. (See Appendix I.)

(2) The commission decided to adopt the opinions expressed in a report of Doctor Ångström "On actinometric investigations of solar and atmospheric radiation," read at the meeting, and decided that this report should be added as an appendix to the protocol.[3]

(3) A paper by Doctor Lindholm "Sur la variation de la constants solaire d'après les mesures spectrobolométriques de M. Abbot et d'après les mesures pyrhéliométriques dans des parties limitées du spectre" was presented at the meeting by Doctor Ångström and the commission decided to include it in their transactions.

(4) In regard to sunshine recording instruments, the commission decided to postpone any definite proposition until the investigation of Doctor Simpson on the same subject is published.

The commission expressed its perfect agreement with the opinion of Doctor Gorczyński that the organization of continuous actinometric measurements in the south of France and of temporary actinometric expeditions to desert regions, equatorial mountains, and to some isolated islands in the central part of the Pacific Ocean would be of great utility for the development of solar researches and a very important step for the realization of an international network of actinometric stations. The commission decided to include the report of Doctor Gorczyński as Appendix III to the protocol.

As new members of the commission were proposed and elected: Boutaric, Dongier, Maurain, Rey (France), Hergesell, Süring (Germany), Kalitin (Russia), Exner, Schmidt (Austria), Schoute, Boerema (Holland), and Dorno, Davos (Switzerland).

[3] Appendix II. An abstract is promised at a later date.—H. H. K.

APPENDIX I.

REMARKS REGARDING A CENTRAL ACTINOMETRIC STATION AND REGARDING THE PYRHELIOMETRIC STANDARD SCALE.

By F. LINDHOLM and A. ÅNGSTRÖM.

At the meeting of the International Union for Cooperation in Solar Research at Mendon in 1907 it was decided that the central actinometric station should be located at Upsala.

According to a former decision at the Oxford meeting of the same union, the compensation pyrheliometer of K. Ångström was accepted as a standard instrument for measuring solar radiation. The "normal" of this instrument was to be kept at the central station for comparison with instruments furnished to various observers. The comparison was made by Ångström in a twofold way. For every instrument the heat produced through the compensation current was computed from a determination of the dimensions of the strip. Thus a computed constant of the instrument was obtained. An empirical value of the same constant was obtained through comparison with the normal. In order that the instrument should be approved, the two constants thus determined must agree within 1 per cent.

In a report to the meeting of the Meteorological Commission for the Study of Solar Radiation, at Rapperswil in 1912, Ångström's successor, Prof. G. Granqvist, showed that the standard instrument had remained unaltered during the time 1905–1912. In a paper on "Comparisons between pyrheliometers and the difference between the Ångström standard and the Smithsonian standard"[4] one of us later showed that the Upsala standard must have remained unchanged also during the time 1912–1918.

Investigations by Marten, Abbot, A. Ångström and others have shown that at present there exists a difference between the Ångström standard and the Smithsonian standard of about 3.5 per cent. For all instruments which are in an uninjured condition, this difference seems however only to vary within less than about 1 per cent. It is probably chiefly due to a small source of error, which was pointed out by one of us in 1913, and afterwards has been more closely investigated by Marten. The error is introduced through a border effect at the strips, which arises from the fact that the strip exposed to the radiation is not illuminated to its whole length.

This source of error is easily eliminated, through adding a certain constant correction to the computed constant.

The compensation pyrheliometers have the following important advantages:

(1) The standard as well as the secondaries are absolute instruments, of which the constants can be easily determined through measuring the width and resistance of the strips.

(2) The readings give momentary values of the radiation.

(3) The constant of the instrument is in high degree independent of climatic variables like temperature, convection and altitude.

The importance of a control of the auxiliary instrument, the milliammeter, must be emphasized.

The following proposals seem therefore justified by the previous discussions:

(1) That the Ångström standard pyrheliometer as well as the Smithsonian, constructed by Abbot, may be used as international standards.

[4] MO. WEATHER REV., November, 1919.